

# The Chicago Green Bungalow Initiative

by the Chicago Department of the Environment

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Domus PLUS

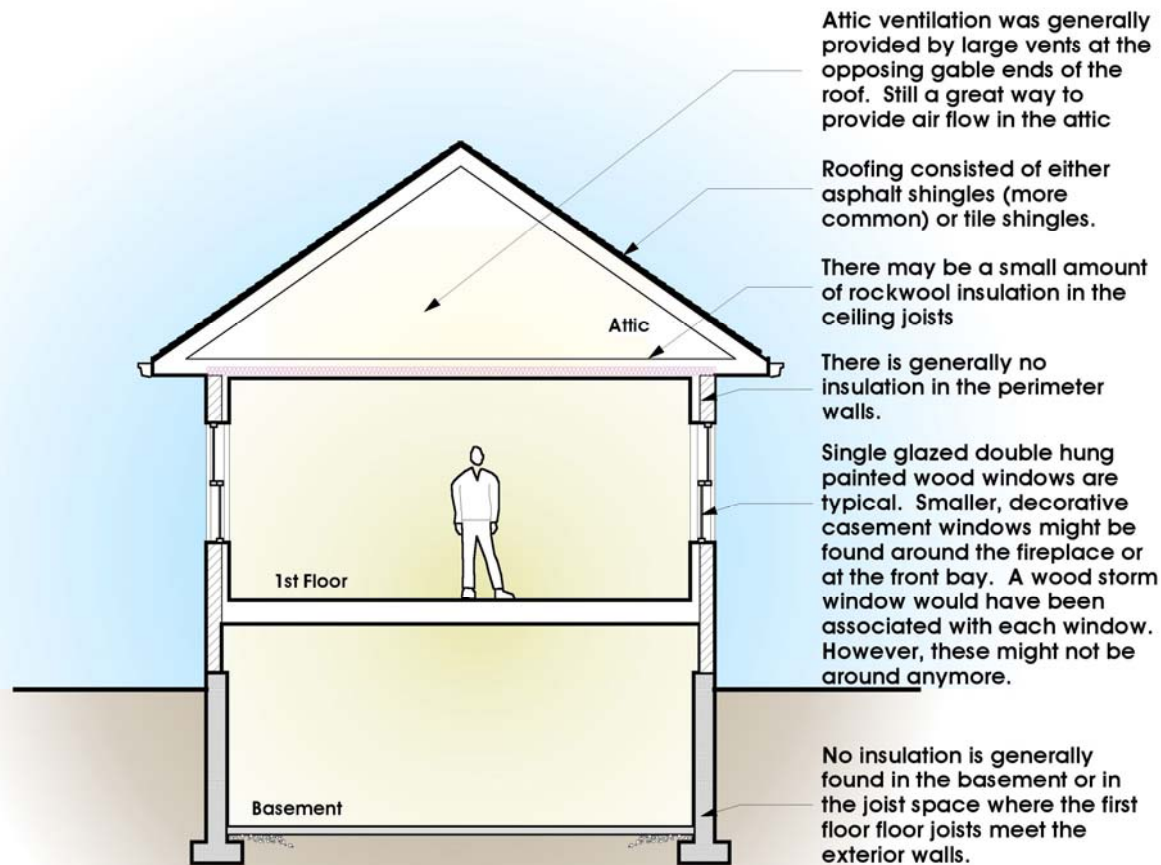
Oak Park, IL



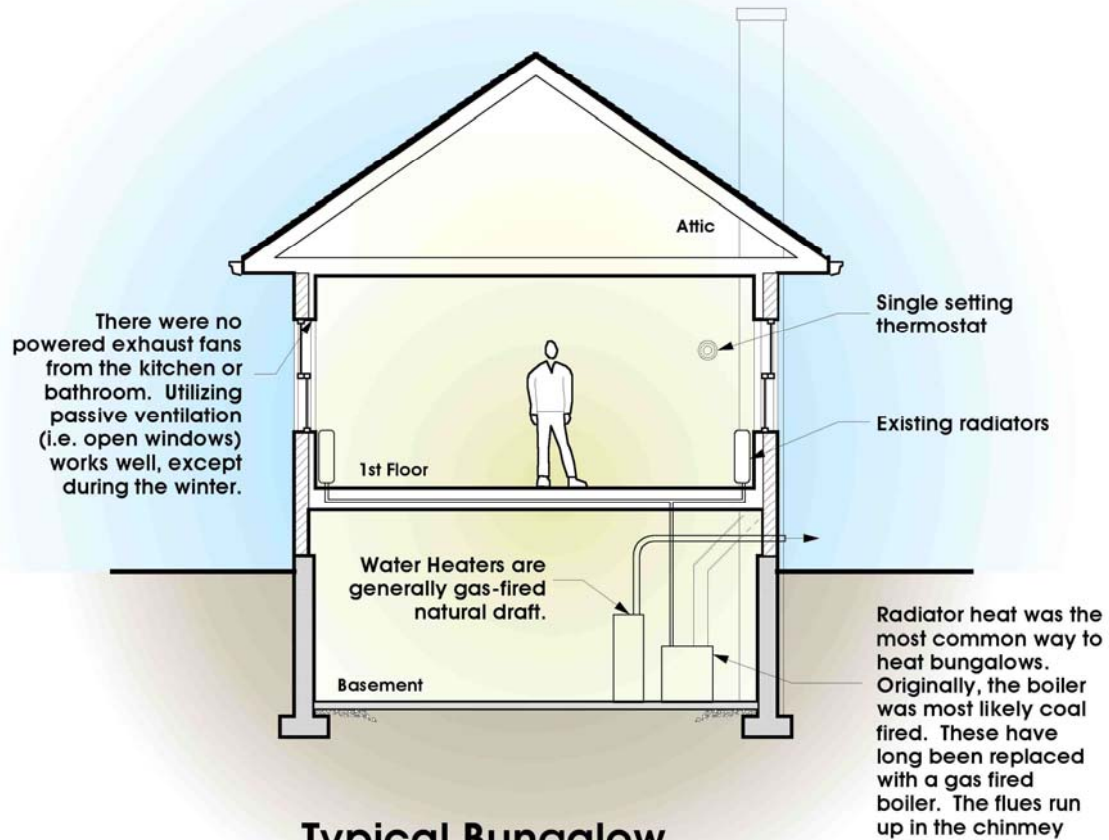
## *Chicago Green Bungalow Initiative*

- ❑ Typical Bungalow Construction Features
- ❑ Design, Energy & “Green” Features of each Bungalow
- ❑ Summary - Energy Savings, “Green” Products & Costs





## Typical Bungalow Envelope



## Typical Bungalow Systems



# 6421 S. Fairfield – (Handicap Accessible)

## Design Features

- ☐ Retrofitted for wheel chair lift at side entrance
- ☐ First floor master suite and laundry room addition
- ☐ Wheel chair accessible kitchen and bathroom
- ☐ 1,400 ft<sup>2</sup> (includes 500 ft<sup>2</sup> addition)
- ☐ Selective demolition



# 6421 S. Fairfield – (Handicap Accessible)

## E n e r g y   F e a t u r e s

- ☐ Geothermal system for heating, cooling and hot water
- ☐ Cellulose insulation in attic
- ☐ Spray foam insulation in walls
- ☐ Foundation insulation
- ☐ New low-E windows





*Retro Foam* spray insulation



R43 cellulose insulation





R10 *Basement Blanket*



R15 foundation wall insulation



Geo-thermal furnace and water heater

# 6421 S. Fairfield – (Handicap Accessible)

Energy Measure	Typical Rehab	Actual Rehab	Additional Cost	Unit Cost
Attic Insulation	R30	R43	\$230	\$0.17/ft <sup>2</sup>
Wall Insulation (existing walls)	None	R4 (injected foam)	\$900	\$0.82/ft <sup>2</sup>
Wall Insulation (addition)	R13 batts	R13 batts + 1" insulated foam board	\$400	\$0.68/ft <sup>2</sup>
Basement/Crawl Space Wall Insulation	None	R10 blanket & R15 in crawl space	\$1,200	\$1.00/ft <sup>2</sup>
Windows	New Double Glazed	New Double Glazed with low-E coating	\$370	\$2.00/ft <sup>2</sup>
Furnace	Standard 80%	Ground Source Heat Pump	\$10,000	
Water Heater	Standard Natural Draft			

Total Rehab Cost: \$192,958 (\$137.82/ft<sup>2</sup>)  
 Total Additional Energy Cost: \$13,100 (\$9.36/ft<sup>2</sup>)  
 Percent Increase: 6.8%



# 6423 S. Fairfield – (Home Office)

## Design Features

- ❑ Home Office addition (262 ft<sup>2</sup>) with separate entrance
- ❑ Partially finished basement
- ❑ 1,300 ft<sup>2</sup> (“gut rehab”)





# 6423 S. Fairfield – (Home Office)

## Energy Features

- ☐ Combination heating system that works as a furnace and hot water heater
- ☐ Radiant floor heat in home office addition
- ☐ Cellulose insulation in attic
- ☐ Rock wool insulation in sidewalls
- ☐ Foundation insulation
- ☐ New low-E windows



# Spray rock wool insulation





## **Lennox *CompleteHeat* System**

Combination space and domestic water heating

# 6423 S. Fairfield – (Home Office)

Energy Measure	Typical Rehab	Actual Rehab	Additional Cost	Unit Cost
Attic Insulation	R30	R43	\$180	\$0.17/ft <sup>2</sup>
Wall Insulation (existing walls)	R9	R15 (blown rock wool)	\$1,060	\$1.02/ft <sup>2</sup>
Wall Insulation (addition)	R13 batts	R13 batts + 1” insulated foam board	\$500	\$0.82/ft <sup>2</sup>
Basement Insulation	None	R13 batts	\$400	\$0.50/ft <sup>2</sup>
Slab Insulation	R10 perimeter	R10 full slab	\$400	\$1.54/ft <sup>2</sup>
Windows	New Double Glazed	New Double Glazed with low-E coating	\$640	\$2.00/ft <sup>2</sup>
Furnace	Standard 80%	Combination Heating System	\$2,000	
Water Heater	Standard Natural Draft			

Total Rehab Cost: \$220,425 (\$169.56/ft<sup>2</sup>)  
Total Additional Energy Cost: \$5,180 (\$3.98/ft<sup>2</sup>)  
Percent Increase: 2.4%



# 6425 S. Fairfield – (Young Professionals)

## Design Features

- ❑ Dormer addition contains master suite, bathroom and sitting area
- ❑ Cathedral ceiling and open floor plan maximize space and light
- ❑ 1,644 ft<sup>2</sup> with 500 ft<sup>2</sup> second floor addition (“gut rehab”)



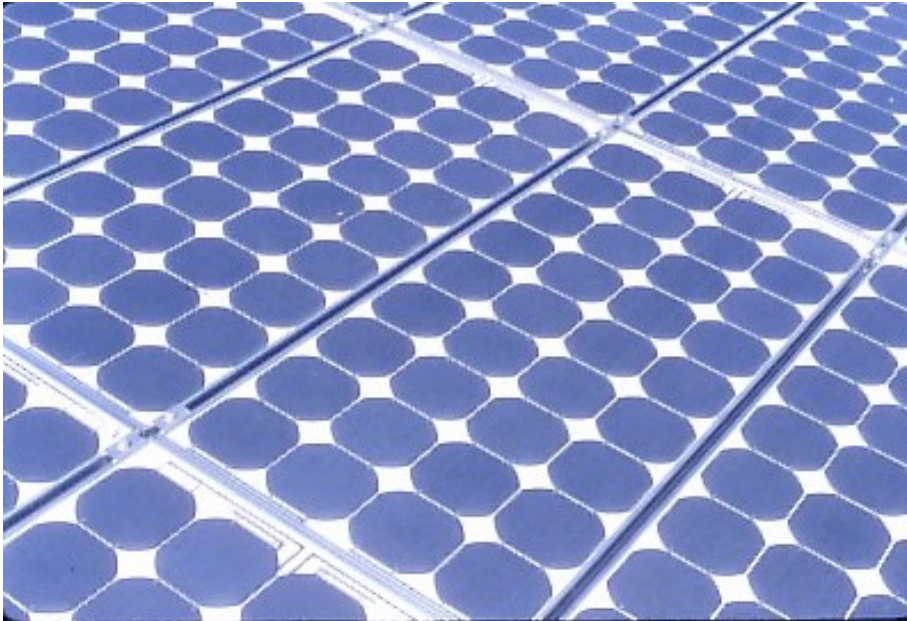
# 6425 S. Fairfield – (Young Professionals)

## Energy Features

- ☐ Solar photovoltaic panels
- ☐ High efficiency gas forced air furnace
- ☐ Rock wool insulation in sidewalls
- ☐ New low-E windows



# Solar Photovoltaic System



- *Spire* system
- 2.4 kw system
- Net metering
- No battery storage
- \$39,049 installed  
(\$16.27/watt)
- \$10.43/watt after  
state grant

# 6425 S. Fairfield – (Young Professionals)

Energy Measure	Typical Rehab	Actual Rehab	Additional Cost	Unit Cost
Attic Insulation	R30	R43	\$100	\$0.17/ft <sup>2</sup>
Wall Insulation (existing walls)	R9	R15 (blown rock wool)	\$1,300	\$1.35/ft <sup>2</sup>
Batt Insulation	Knee walls: R11 rafter cavity: R19	Knee walls: R18 Rafter cavity: R21	\$1,100	\$0.95/ft <sup>2</sup>
Basement Insulation	None	R10 blanket	\$1,000	\$1.00/ft <sup>2</sup>
Windows	New Double Glazed	New Double Glazed with low-E coating	\$475	\$2.00/ft <sup>2</sup>
Furnace	Standard 80%	94% Efficient	\$600	

Total Rehab Cost:	\$175,200	(\$106.57/ft <sup>2</sup> )
Total Additional Energy Cost:	\$4,575	(\$2.78/ft <sup>2</sup> )
Percent Increase:	2.6%	



# 6448 S. Fairfield – (Classic Restoration)

## Design Features

- ❑ Classically restored bungalow
- ❑ Original doors, trim and flooring add historic feel
- ❑ 1,268 ft<sup>2</sup> with framed second floor for expansion



# 6448 S. Fairfield – (Classic Restoration)

## E n e r g y   F e a t u r e s

- ❑ Sealed combustion boiler system at 88% efficiency
- ❑ *Unico* high velocity air conditioning
- ❑ Recycled denim insulation in knee walls; cellulose insulation in ceiling; rigid foam insulation in basement
- ❑ Storm windows with low-e glass





- R10 (2") extruded polystyrene insulation







Cotton insulation (R13) in knee walls





- *Unico* high velocity air conditioning system (SEER 12.0)
- 2" diameter flexible branch lines



# 6448 S. Fairfield – (Classic Restoration)

Energy Measure	Typical Rehab	Actual Rehab	Additional Cost	Unit Cost
Attic Insulation	R30	R43	\$120	\$0.17/ft <sup>2</sup>
Wall Insulation	None	None	\$0	\$0
Knee Walls	R13	R13 denim insulation	\$125	\$0.25/ft <sup>2</sup>
Basement Insulation	None	R10 foam board	\$1,445	\$1.50/ft <sup>2</sup>
Windows	Typical triple-track storms	Low-E storm	\$700	\$2.00/ft <sup>2</sup>
Boiler	Standard 80%	88% Efficient	\$1,000	

Total Rehab Cost:	\$131,153	(\$103.43/ft <sup>2</sup> )
Total Additional Energy Cost:	\$3,390	(\$2.67/ft <sup>2</sup> )
Percent Increase:	2.6%	

# Green Bungalow Evaluation



- Energy Savings
- “Green” Products
- Costs

# Space Heating Energy Savings

	Typical	Predicted	Actual 03/04	Savings (\$ <sup>1</sup> )
6421	48,496 kwh	13,734 kwh	8,471 kwh	40,025 kwh (\$1,602 <sup>2</sup> )
6423	1,915 th	943 th	721 th	1,194 th (\$716)
6425	2,050 th	588 th	606 th	1,444 th (\$866)
6448	2,015 th	1,244 th	1,056 th	959 th (\$575)

<sup>1</sup> – at \$0.60/therm

<sup>2</sup> – ComEd “all-electric rate”: 0 – 400 kwh = \$0.0828; + 400 kwh @ \$0.0373; savings based on a 6-month heating season





## Cost Effectiveness

	Annual Savings	Payback	Life Cycle Savings
6421 S. Fairfield	\$1,620	8.1 years	1.76
<i>6421 S. Fairfield</i>	<i>\$646</i>	<i>20.3 years</i>	<i>0.74</i>
6423 S. Fairfield	\$867	6.0 years	2.50
6425 S. Fairfield	\$916	5.0 years	3.00
6448 S. Fairfield	\$742	4.6 years	3.27

	Additional Cost for Energy Measures	Monthly Savings	Monthly Cost to Finance 15 yrs	Net Cash Flow
6421	\$13,100	\$135	\$107.03	+ \$27.97
<i>6421</i>	<i>\$13,100</i>	<i>\$54</i>	\$107.03	- \$53.03
6423	\$5,180	\$72	\$42.32	+ \$29.68
6425	\$4,575	\$76	\$37.37	+ \$38.63
6448	\$3,390	\$62	\$27.70	+ \$34.30

15 years @ 5.5%; \$8.17/%1,000 borrowed

## Cost Difference to Include Energy Efficiency

Total Cost Difference:	\$26,245
Total Building Square Footage:	5,612 ft <sup>2</sup>
Energy Efficient Cost/ft <sup>2</sup> :	\$4.68/ft <sup>2</sup>

Total Rehab Cost:	\$719,736
Rehab Cost/ft <sup>2</sup> :	\$128.25 ft <sup>2</sup>
Percent Cost Increase:	3.6%

Item	\$ Difference	Quantity (ft <sup>2</sup> )	\$/Unit
Cork Flooring <sup>1</sup>	\$520	130	\$4.00
Linoleum <sup>2</sup>	\$1,722	287	\$6.00
Recycled Content Drywall	\$1,040	20,800	\$0.05
Recycled Rubber Floor <sup>2</sup>	\$525	150	\$3.50
Slate Flooring <sup>3</sup>	\$267	213	\$1.25
Recycled Denim Insulation <sup>4</sup>	\$250	540	\$0.46
Low VOC Paint	\$360	80 gals	\$4.50
Recycled Carpet <sup>5</sup>	\$0	640	\$0.00
Cement Siding <sup>6</sup>	\$1,000	2,000	\$0.50
ACQ Treated Lumber	Required beginning January 1, 2004		
<b>TOTAL:</b>	<b>\$5,684</b>		

1- compared to carpet

2 – compared to vinyl tile

3 – compared to ceramic tile

4 – compared to R13 fiberglass batts

5 – compared to carpet @ \$1.50 to 2.00 ft<sup>2</sup>

6 – compared to vinyl siding

## Cost Difference to Build “Green”

Total Cost Difference:	\$5,684
Total Building Square Footage:	5,612 ft <sup>2</sup>
Resource Efficient Cost/ft <sup>2</sup> :	\$1.01/ft <sup>2</sup>
Total Rehab Cost:	\$719,736
Rehab Cost/ft <sup>2</sup> :	\$128.25 ft <sup>2</sup>
Percent Cost Increase:	0.79%



# For More Info:

## The Chicago Green Bungalow Initiative

6421 S. Fairfield  
6423 S. Fairfield  
6425 S. Fairfield  
6448 S. Fairfield



January, 2004

by the  
Chicago Department of the Environment  
Richard M. Daley, Mayor

<http://www.cityofchicago.org/Environment/GreenTech/pdf/GreenBungalowRpt.pdf>